Quantitative Equity Ranking Frameworks: Constructing a Multi-Factor Momentum Scorecard for Indian Markets

1. Introduction: From Binary Screening to Continuous Ranking

The evolution of a quantitative trading strategy typically progresses through distinct stages of maturity. The initial phase involves the construction of a **screener**, a binary filter that sieves the investable universe—such as the Nifty 500 or Nifty Smallcap 250—to identify securities that meet a specific set of technical or fundamental criteria. Your current screening architecture, utilizing Volume, 50-period and 200-period Exponential Moving Averages (EMA), Bollinger Bands, Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD), and Average True Range (ATR), represents a robust foundation for identifying momentum candidates. However, the operational limitation of a screener lies in its lack of dimensionality; it answers the question of *eligibility* but fails to address the question of *desirability*.

In a binary screening paradigm, a stock with an RSI of 51 is treated identically to a stock with an RSI of 69, provided both meet a "greater than 50" threshold. Yet, from a capital allocation perspective, these two assets represent vastly different return probabilities and volatility profiles.[1] When the screener returns 50 eligible candidates but the investor possesses finite capital sufficient for only 10 positions, the absence of a ranking mechanism forces the investor to revert to subjective discretion, thereby reintroducing the very behavioral biases—such as recency bias or affinity bias—that quantitative systems are designed to eliminate.

This research report delineates the theoretical and mathematical architecture for transforming a binary screener into a **Continuous Ranking Scorecard**. This transition is essential for solving the resource allocation problem inherent in portfolio management. By quantifying the *degree* of technical strength across multiple dimensions—trend, momentum, volatility, and volume—we can construct a Composite Momentum Score that objectively ranks the investable universe.[2] Furthermore, this report addresses the critical "Challenger vs. Incumbent" decision framework, providing a mathematically rigorous method for portfolio rotation that accounts for the specific microstructural frictions of the Indian equity market, such as the Securities Transaction Tax (STT) and impact costs.[4]

The objective is to build a decision engine that not only identifies which stocks are rising but mathematically determines which stocks possess the highest quality momentum, adjusted for risk and volatility. This requires a deep exploration of data normalization techniques, weighted factor modeling, and the formulation of hysteresis loops to manage portfolio turnover efficiently.

2. Mathematical Architectures for Data Normalization

The fundamental challenge in converting a multi-indicator screener into a ranking system is the heterogeneity of the underlying data scales. The indicators selected for this strategy operate on incompatible numerical planes:

- **RSI** is a bounded oscillator (0 to 100).
- **MACD** is an unbounded absolute value derivative of price (e.g., a value of 200 for MRF Ltd vs. 5 for Zomato).
- **Volume** is a log-normal distribution dependent on market capitalization and float.
- **Bollinger Band Width** is a relative percentage measure.
- **EMA Distance** is a percentage deviation.

To combine these into a single "Score," one cannot simply sum the raw values. Doing so would allow high-priced stocks (affecting MACD) or high-volume stocks to mathematically dominate the score, rendering the rank useless for comparative analysis.[6] Therefore, a robust normalization architecture is the prerequisite for any scoring logic.

2.1 The Percentile Ranking Framework

For a broad and diverse universe like the Indian stock market, where asset prices range from double digits to six digits (e.g., MRF), **Percentile Ranking** offers the most robust normalization method. This non-parametric approach transforms raw indicator values into a uniform distribution ranging from 0 to 100, representing the stock's relative standing within the universe.[8]

The mathematical formulation for the percentile rank (P_{rank}) of a stock i for a given indicator X is defined as:

$$P_{rank, i} = \frac{C_{below} + 0.5 \times C_{equal}}{N} \times 100$$

Where:

- C_{below} represents the count of stocks in the screened universe with a raw indicator value lower than stock i.
- C_{equal} represents the count of stocks with a raw indicator value equal to stock i.
- N is the total number of stocks in the investable universe (e.g., 500 for Nifty 500).

This transformation ensures that every indicator contributes equally to the final composite score, regardless of its original unit of measurement. If a stock has an RSI of 65, and that value is higher than 80% of the universe, it receives a score of 80. If its Volume is higher than 80% of the universe, it also receives a score of 80. These two "80s" are now mathematically comparable and can be weighted and summed.[10]

The primary advantage of percentile ranking in the Indian context is its resilience to outliers. In momentum strategies, a single stock experiencing a corporate action or a parabolic move might register a Volume spike of 5,000%. In a linear normalization model (Min-Max scaling), this outlier would compress the rest of the universe into the 0-5% range, destroying the granularity of the ranking. Percentile ranking handles this gracefully; the outlier is simply Rank 100, and the second-highest stock is Rank 99.8, preserving the relative ordering of the entire cohort.[11]

2.2 Z-Score Standardization (Standard Score)

While percentile ranking is excellent for ordering, it discards information regarding the *magnitude* of outperformance. A stock at the 99th percentile might be slightly better than the 98th, or it might be exponentially better. To capture magnitude, particularly for mean-reverting indicators like Bollinger Band Width or deviation from the 200 EMA, **Z-Score Standardization** is the preferred methodology.[2]

The Z-Score (Z) quantifies how many standard deviations (σ) a data point (X) is from the universe mean (μ):

$$Z_i = \frac{X_i - \mu}{\sigma}$$

In the context of the user's momentum strategy, Z-Scores are particularly valuable for measuring "abnormality." For instance, if the average distance from the 200 EMA for the Nifty 500 is +5% with a standard deviation of 10%, a stock trading at +25% above its 200 EMA would have a Z-Score of +2.0. This indicates a statistically significant trend strength.

To integrate Z-Scores into a 0-100 scorecard, the values are typically "Winsorized" (capped) to eliminate extreme outliers (e.g., limiting the range to $\pm 3\sigma$) and then mapped to a linear scale:

$$\text{Score}_Z = \text{MIN}\left(100, \text{MAX}\left(0, 50 + (Z \times 16.66)\right)\right)$$

This formula maps a Z-Score of 0 (mean) to a score of 50, a Z-Score of +3 to 100, and -3 to 0. Institutional momentum indices, such as the MSCI Momentum Index, heavily utilize Z-Score methodologies to combine different time-horizon returns (e.g., 6-month and 12-month momentum) into a single factor score.[2] This approach allows the user to reward stocks that are not just "better than average" but are statistical outliers in terms of trend strength.

2.3 Min-Max Scaling

The third approach, often found in simpler technical analysis platforms, is **Min-Max Scaling**. This linearly transforms the data range to a fixed interval, typically .

$$X_{norm} = \frac{X_i - X_{min}}{X_{max} - X_{min}} \times 100$$

While computationally simple, this method is highly susceptible to "outlier compression." If used for indicators like Volume or MACD in the Indian market, where the disparity between large-cap and small-cap values is immense, the resulting scores will be heavily skewed. Consequently, this report recommends Min-Max scaling *only* after applying a logarithmic transformation to the raw data (e.g., using Log(Volume) instead of Volume) or for bounded indicators where the theoretical max is known. For the purpose of the user's robust ranking system, Percentile Ranking and Z-Scores remain the superior choices.[11]

3. Indicator-Specific Scoring Methodologies

The core of the ranking system lies in translating the eight specified indicators—Volume, 50 EMA, 200 EMA, Bollinger Bands, BB Width, RSI, MACD, and ATR—into quantifiable "Factor Scores." Each indicator requires a specific derivative calculation to assess "Momentum Quality" rather than just raw values.

3.1 Volume: The Fuel of Momentum

In technical analysis, volume precedes price. For a ranking scorecard, raw volume is irrelevant because it is a function of share count and price. A stock trading 1 million shares at ₹50 has lower turnover than a stock trading 100,000 shares at ₹2,000. Therefore, the scorecard must utilize **Relative Volume (RVOL)** and **Volume Trend**.[14]

3.1.1 Relative Volume (RVOL)

RVOL measures current participation relative to the stock's own history, isolating the "surprise" factor in liquidity which often accompanies institutional accumulation.

- Metric: Ratio of Current Volume to the 20-day Simple Moving Average (SMA) of Volume.

  $$\text{RVOL} = \frac{\text{Vol}_{today}}{\text{SMA}(\text{Vol}, 20)}$$
- **Ranking Logic:** In momentum strategies, higher RVOL validates the price move. A stock rising 5% on 2x average volume is a higher-quality signal than a stock rising 5% on 0.5x volume.
- **Scoring:** Percentile Rank of RVOL.
  - *Interpretation:* High percentile implies a "High Conviction" move.

3.1.2 Volume-Price Correlation

To differentiate between accumulation (buying) and distribution (selling), the correlation between price changes and volume changes over a lookback period (e.g., 10 days) serves as a potent ranking factor.

- **Metric:** Pearson correlation coefficient between ΔP and Volume.
- **Ranking Logic:** Positive correlation implies that volume expands on up days and contracts on down days—a hallmark of a healthy bullish trend. Negative correlation implies volume is higher on down days (distribution), identifying potential "traps" despite high prices.

3.2 Exponential Moving Averages (50 & 200 EMA): Trend Hierarchy

Moving averages serve as the primary trend filter. In a ranking system, their role extends beyond simple crossovers to quantifying the *quality* and *stability* of the trend.[15]

3.2.1 Trend Slope (Velocity)

A stock trading above its 50 EMA is bullish, but a 50 EMA that is rising at a steep angle indicates a stronger trend velocity than a flat 50 EMA.

- Metric: The annualized slope or percentage rate of change of the 50 EMA itself.

  $$\text{Slope}_{50} = \frac{\text{EMA}_{50, today} - \text{EMA}_{50, 5-days-ago}}{\text{EMA}_{50, 5-days-ago}}$$
- **Ranking Logic:** Stocks are ranked by this slope metric. A steeper positive slope contributes to a higher momentum score.[17]

3.2.2 Trend Extension (Mean Reversion Risk)

While momentum seeks stocks that are extended, excessive extension from the long-term mean (200 EMA) often precedes a pullback (mean reversion). This creates a non-linear scoring requirement.

- Metric: Percentage distance from the 200 EMA.

  $$\text{Dist}_{200} = \frac{\text{Price} - \text{EMA}_{200}}{\text{EMA}_{200}}$$
- **Scoring Logic:** Unlike other factors where "more is better," this factor utilizes a "Goldilocks" curve.
  - **Zone 1 (0% - 10%):** Early stage trend. Score: High.
  - **Zone 2 (10% - 40%):** Strong trend. Score: Maximum.
  - Zone 3 (> 50%): Overextended. Score: Degrades.
    This protects the investor from buying the "top" of a parabolic move. The ranking algorithm should penalize Z-Scores > 2.5 on this metric to manage risk.15

3.3 Bollinger Bands: Volatility Context

Bollinger Bands (20-day SMA $\pm$ 2 Standard Deviations) provide a dynamic relative definition of high and low. For a momentum screener, they identify two critical states: the

Squeeze (volatility compression) and the **Breakout** (volatility expansion).[18]

3.3.1 Bollinger Band Width (The Squeeze)

Momentum is often born from low-volatility consolidations.

- Metric:

  $$\text{BBW} = \frac{\text{Upper Band} - \text{Lower Band}}{\text{Middle Band}}$$
- **Ranking Logic:**
  - *Strategy A (Pre-Breakout):* Rank stocks by **Lowest** BBW (ascending order). This identifies stocks in a "Squeeze" ready to explode.
  - *Strategy B (Trend Following):* Rank stocks by **Expanding** BBW. This identifies stocks where the move is underway.
  - *Recommendation:* For a composite scorecard, use the *Rate of Change* of BBW. Rising BBW combined with rising price is the strongest momentum signal.

3.3.2 %B Indicator (Position within Bands)

This metric quantifies the price relative to the bands.

- Metric:

  $$\%B = \frac{\text{Price} - \text{Lower Band}}{\text{Upper Band} - \text{Lower Band}}$$
- **Ranking Logic:**
  - $\%B > 1.0$: Price is "walking the bands" (strongest momentum).
  - $\%B < 0.5$: Price is in the lower half (bearish/weak).
  - The scorecard should heavily reward stocks with $\%B \in [0.8, 1.1]$.[20]

3.4 Relative Strength Index (RSI): Velocity and Regimes

The RSI is widely misunderstood as a simple mean-reversion tool (Buy < 30, Sell > 70). In momentum investing, the range shifts upwards. A stock in a strong bull run often oscillates between 40 and 80. An RSI dropping to 30 usually signifies a broken trend, not a buy opportunity.[21]

3.4.1 Regime-Based Scoring

The ranking system must adapt the RSI interpretation to the momentum context.

- **Metric:** 14-period RSI (smoothed with a 3-day SMA to reduce noise).
- **Scoring Map:**
  - **RSI 0-40:** Score 0 (Bearish/Dead).
  - **RSI 40-50:** Score 25 (Warming up).
  - **RSI 50-70:** Score 100 (The Momentum Sweet Spot).
  - **RSI 70-85:** Score 90 (Strong but approaching overbought).
  - RSI > 85: Score 60 (Climactic risk/Blow-off top).

This non-linear mapping ensures the scorecard selects stocks with sustainable momentum velocity rather than just the highest raw number.23

3.5 MACD: Trend Acceleration

The Moving Average Convergence Divergence (MACD) indicator measures the relationship between two EMAs (12 and 26). However, the raw MACD value is price-dependent, making it unsuitable for ranking a universe of diverse stock prices.

3.5.1 The Percentage Price Oscillator (PPO) Solution

To make MACD comparable across stocks, it must be normalized by price or converted to the **Percentage Price Oscillator (PPO)**.[7]

- Metric:

  $$\text{PPO} = \frac{\text{EMA}_{12} - \text{EMA}_{26}}{\text{EMA}_{26}} \times 100$$
- **Ranking Logic:** PPO represents the percentage spread between the fast and slow averages. A PPO of 5% implies the 12 EMA is 5% above the 26 EMA. Stocks are ranked by PPO in descending order; higher PPO indicates stronger trend acceleration.

3.5.2 Histogram Momentum

The derivative of the MACD (the Histogram) indicates the *change* in momentum.

- **Metric:** Slope of the Histogram (Current Histogram - Previous Histogram).
- **Ranking Logic:** A positive slope indicates the trend is accelerating. A negative slope, even if PPO is positive, indicates deceleration. The scorecard should ideally combine PPO Rank (Trend) and Histogram Rank (Acceleration) for a holistic view.[25]

3.6 Average True Range (ATR): Risk-Adjusted Returns

Perhaps the most critical component for a "finite money" constraint is the **Average True Range (ATR)**. It serves as the denominator for risk-adjusting returns. A stock that gains 20% with 2% daily volatility is superior to a stock that gains 20% with 10% daily volatility (which is likely to stop you out).[26]

3.6.1 Volatility-Adjusted Momentum Score

This metric is often referred to as the "Efficiency Ratio" or "Sharpe-like Momentum."

- Metric:

  $$\text{Risk Adjusted Mom} = \frac{\text{ROC}_{20}}{\text{ATR}_{14} / \text{Price}}$$

  (Where ROC_{20} is the 20-day Rate of Change).
- **Ranking Logic:** This identifies the "smoothest" rides. Ranking stocks by this metric filters

out high-beta "junk" rallies and prioritizes high-quality, institutional trends. In the Indian market, where small-cap volatility can be extreme, this factor is the primary defense against "pump and dump" patterns.[2]

4. Construction of the Composite Scorecard

Having defined the normalized metrics for each indicator, the next phase is the assembly of the **Composite Scorecard**. This engine aggregates the disparate signals into a single numerical value (0-100) for every stock in the screener results, enabling definitive ranking.

4.1 Weighting Strategy

Not all indicators hold equal predictive power. For a momentum strategy, the hierarchy of importance typically flows from Trend Direction $\rightarrow$ Momentum Velocity $\rightarrow$ Volatility/Risk $\rightarrow$ Confirmation. The proposed weighting matrix for the Indian market context is as follows:

Factor Category	Indicator(s)	Metric	Weight	Rationale
Trend Strength	50/200 EMA	Slope & Golden Cross Status	**30%**	The foundational requirement. Ensures alignment with the primary trend.
Momentum Velocity	RSI & MACD	Smoothed RSI & PPO Rank	**25%**	Measures the speed of the move. High velocity attracts further capital.
Risk Efficiency	ATR	Risk-Adjusted Return (ROC/ATR)	**20%**	Penalizes choppy price action; rewards smooth trends essential for

				holding.
Conviction	Volume	Relative Volume (RVOL)	**15%**	Validates institutional participation; filters retail traps.
Structure	Bollinger Bands	Band Width Expansion & %B	**10%**	Contextualizes the move (breakout vs. extension).

4.2 Handling Correlations and Collinearity

Indicators like RSI and MACD are mathematically correlated (both derivatives of price momentum). Overweighting both can lead to "double counting" the same signal. The weighting matrix above allocates 25% combined to these oscillators to prevent this redundancy from dominating the Trend and Risk factors. The inclusion of Volume and ATR (which are independent of price momentum) ensures the Composite Score is multidimensional.[28]

4.3 The Scoring Algorithm

For every stock S in the filtered universe, the Composite Score (C_S) is calculated as:

$$C_S = \sum (W_f \times R_f)$$

Where W_f is the weight of factor f, and R_f is the Percentile Rank (0-100) of that factor for stock S.

Example Calculation:

- **Stock:** Tata Power
- **Trend Rank (EMA Slope):** 80th Percentile ($0.30 \times 80 = 24$)
- **Momentum Rank (RSI/PPO):** 90th Percentile ($0.25 \times 90 = 22.5$)
- **Efficiency Rank (ROC/ATR):** 60th Percentile ($0.20 \times 60 = 12$)
- **Volume Rank (RVOL):** 95th Percentile ($0.15 \times 95 = 14.25$)
- **Structure Rank (BB):** 70th Percentile ($0.10 \times 70 = 7$)
- **Total Composite Score:** $24 + 22.5 + 12 + 14.25 + 7 = \mathbf{79.75}$

This output allows the user to instantly sort the 50 screener results and identify that a stock with a score of 79.75 is mathematically "better" than one with a score of 62, based on the user's defined preference for high-volume, efficient trends.[30]

4.4 The "Penalty Box" (Hard Filters)

While the weighted score handles relative quality, certain "toxic" conditions must trigger an immediate downgrade, regardless of the weighted sum. These are "Deal Breakers."

- **Earnings Volatility Event:** If ATR spikes > 100% in 2 days (often due to earnings surprise or news), set Score = 0 to avoid volatility crush.
- **Broken Trend:** If Price < 200 EMA, set Score = 0 (Momentum implies uptrend; below 200 EMA is a reversion play, not momentum).
- **Liquidity Trap:** If Daily Turnover < ₹5 Crores, set Score = 0 (To prevent impact cost from destroying alpha).

5. Portfolio Management Logic: The Decision Engine

The user's second critical requirement is the decision framework for capital allocation: *How to compare a new recommendation (Challenger) with an already invested item (Incumbent) to decide on replacement*. This is where the ranking system integrates with portfolio management theory.

5.1 The Cost of Rotation: STT and Friction

In the Indian equity market, portfolio turnover is not free. The **Securities Transaction Tax (STT)** on delivery-based selling is 0.1% of the transaction value. Additionally, brokerage fees, exchange turnover charges, SEBI turnover fees, GST (18% on fees), and Stamp Duty create a friction layer. Furthermore, the "Impact Cost" (the difference between the theoretical price and the actual execution price due to bid-ask spreads) adds to the loss.[4]

A conservative estimate for the round-trip cost (Buy + Sell) of a position is between **0.25% and 0.50%**. Therefore, replacing a stock imposes an immediate performance penalty. A Challenger stock must offer a theoretical expected return that exceeds the Incumbent's expected return *plus* this friction cost. If the scorecard difference is negligible, rotation destroys value.

5.2 The Challenger vs. Incumbent Algorithm (Hysteresis Loop)

To solve this, we implement a **Hysteresis Loop** (or Switching Buffer). This logic prevents the system from "flapping" (rapidly buying and selling) when two stocks have similar scores.[32]

The Switching Formula

A switch from an Incumbent (I) to a Challenger (C) is triggered **only if**:

$$\text{Score}_C > \text{Score}_I \times (1 + \text{Buffer})$$

- **Recommended Buffer:** 20% to 25%.
- **Logic:** The Challenger must be significantly superior to the Incumbent to justify the switching costs and the loss of "holding period" benefits (Long Term Capital Gains tax becomes 12.5% only after 1 year; churning resets this clock).

Scenario:

- **Incumbent (Held):** Score 70.
- **Challenger (New):** Score 80.
- **Decision:** $70 \times 1.25 = 87.5$. Since $80 < 87.5$, **HOLD**. Do not switch. The marginal improvement in momentum quality (10 points) is insufficient to overcome the friction and risk of entering a new position.

5.3 Ranking Degradation (The Absolute Exit)

While the Buffer manages *relative* exits (replacement), the system also requires an *absolute* exit rule for when a stock simply stops performing.

- **Degradation Threshold:** If Score_I drops below 50 (or a specific percentile, e.g., bottom 40% of universe), the stock is sold immediately.
- This creates a "Vacancy" in the portfolio.
- **Vacancy Filling:** Once a vacancy exists, the Buffer rule is irrelevant. The capital is allocated to the highest-ranked Challenger available in the screener.[34]

5.4 Position Sizing with Finite Money (ATR Parity)

The user has "finite money." Allocating equal capital (e.g., ₹1 Lakh) to every stock is suboptimal because ₹1 Lakh in a low-volatility stock (Rank 10) carries less risk than ₹1 Lakh in a high-volatility stock (Rank 1).
To maximize the efficiency of finite capital, the ranking system should be paired with ATR-Based Position Sizing (Volatility Sizing).26

$$\text{Shares} = \frac{\text{Total Capital} \times \text{Risk per Trade \%}}{\text{ATR} \times \text{Stop Loss Multiplier}}$$

This ensures that the *risk* allocated to the #1 Rank stock is equal to the risk allocated to the #5 Rank stock, preventing a lower-ranked but highly volatile stock from dominating the portfolio's P&L.

5.5 Rebalancing Frequency

The frequency of running this ranking logic significantly impacts returns.

- **Daily Rebalancing:** High noise, excessive STT costs. Not recommended for individual investors.
- **Monthly Rebalancing:** The academic standard.[37] It aligns well with the "intermediate momentum" typically captured by 12-month and 6-month lookbacks.

- **The Fortnightly Hybrid:** For the Indian market, which moves faster than developed markets, a **Bi-weekly (Fortnightly)** review is often optimal.[38]
    - *Process:* Every 2 weeks, update all scores. Check Degradation exits. Check Challenger buffers. Execute trades. This balances responsiveness with cost efficiency.

6. Detailed Implementation Logic

Step 1: Universe & Data

- **Universe:** Nifty 500 (covers 95% of market cap).
- **Filters:** Avg Daily Turnover > ₹10 Cr, Price > ₹50.

Step 2: Calculate Metrics (Excel/Python Logic)

- **Metric 1 (Trend):** (Price - EMA200)/EMA200.
- **Metric 2 (RSI):** SMA(RSI, 3).
- **Metric 3 (MACD):** (MACD_Line / Price).
- **Metric 4 (Efficiency):** (Close / Close_126_days) / (ATR_14 / Price). (6-month return / Volatility).
- **Metric 5 (Volume):** Vol / SMA(Vol, 20).
- **Metric 6 (BB):** (Upper - Lower) / Mid.

Step 3: Normalize

- Compute PERCENTRANK.INC (Excel) or scipy.stats.percentileofscore (Python) for each metric across the 500 stocks.

Step 4: Aggregate

- Total_Score = (0.3*Trend_Rank) + (0.25*RSI_Rank) + (0.15*MACD_Rank) + (0.2*Efficiency_Rank) + (0.1*Vol_Rank).

Step 5: Execution Decision

- **For Holdings:** Update Scores. Sell if Score < 40.
- **For Cash:** Buy Top Score.
- **For Swap:** Calculate New_Score > Old_Score * 1.25.

7. Conclusion

By implementing this Composite Scorecard, the investor transitions from a passive observer of technical signals to an active manager of statistical probability. The scorecard normalizes disparate data into a common language (0-100), weights factors according to their predictive power in momentum trends, and creates a disciplined, mathematical barrier to entry for new positions.

In the Indian context, the inclusion of **ATR-based efficiency metrics** and **STT-adjusted buffer logic** is the differentiator between a theoretical model and a profitable live strategy. This framework ensures that "finite money" is always deployed into the highest-quality trends while minimizing the friction costs that silently erode compounding returns.

8. Appendix: Tables and References

Indicator	Ranking Metric (Calculated)	Normalization	Weight
Trend	50/200 EMA Distance & Slope	Percentile	30%
RSI	3-Day Smoothed RSI	Linear Regime Map	15%
MACD	PPO (Normalized MACD)	Percentile	10%
ATR	Risk-Adjusted Return (Sharpe)	Percentile	20%
Volume	Relative Volume (RVOL)	Percentile	15%
B-Bands	Band Width Expansion	Z-Score	10%

Key References:

- *Methodology for Momentum Indexes (MSCI).*[2]
- *Normalization Techniques for Technical Indicators.*[10]
- *Rebalancing and Turnover Management.*[32]
- *Indian Market Nuances (STT, Volatility).*[4]

Works cited

1. 15 Essential Momentum Indicators Every Technical Analyst Must Know - Strike Money, accessed December 10, 2025,

https://www.strike.money/technical-analysis/momentum-indicators
2. MSCI Momentum Indexes Methodology, accessed December 10, 2025, https://www.msci.com/index/methodology/latest/Momentum
3. Momentum-integrated Multi-task Stock Recommendation with Converge-based Optimization, accessed December 10, 2025, https://arxiv.org/html/2509.10461v1
4. New STT Rules in F&O Trading Effective from 1st October 2024 - ICICIdirect, accessed December 10, 2025, https://www.icicidirect.com/research/equity/finace/new-stt-rules-in-futures-and-options-trading
5. Is STT Firing India's Derivatives Boom or Retail Investor Losses? - Share India, accessed December 10, 2025, https://www.shareindia.com/knowledge-center/derivatives/is-stt-firing-indias-derivatives-boom-or-retail-investor-losses
6. Ideas and technics to normalize stock market data for machine learning in a way that preserves proportion between OHLC and between days, weeks, months, years. : r/algotrading - Reddit, accessed December 10, 2025, https://www.reddit.com/r/algotrading/comments/o1u30m/ideas_and_technics_to_normalize_stock_market_data/
7. Price Oscillator (PPO) Indicator: Comparing Two Moving Averages - LuxAlgo, accessed December 10, 2025, https://www.luxalgo.com/blog/price-oscillator-ppo-indicator-comparing-two-moving-averages/
8. Percentile Rank Formula In Excel - How To Calculate?, Examples - WallStreetMojo, accessed December 10, 2025, https://www.wallstreetmojo.com/percentile-rank-formula/
9. PERCENTRANK Function - Overview, Formula, How To Use - Corporate Finance Institute, accessed December 10, 2025, https://corporatefinanceinstitute.com/resources/excel/percentrank-function/
10. How Calculate Composite Index works—ArcGIS Pro | Documentation, accessed December 10, 2025, https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/how-calculate-composite-index-works.htm
11. Normalization — Indicatori e strategie - TradingView, accessed December 10, 2025, https://it.tradingview.com/scripts/normalization/
12. MSCI Momentum Indices Methodology, accessed December 10, 2025, https://www.msci.com/eqb/methodology/meth_docs/MSCI_Momentum_Indices_Methodology_Nov13.pdf
13. The Impact of Data Normalization on Stock Market Prediction: Using SVM and Technical Indicators | Request PDF - ResearchGate, accessed December 10, 2025, https://www.researchgate.net/publication/308437980_The_Impact_of_Data_Normalization_on_Stock_Market_Prediction_Using_SVM_and_Technical_Indicators
14. How to Use Volume-Weighted Indicators in Trading | Charles Schwab, accessed December 10, 2025, https://www.schwab.com/learn/story/how-to-use-volume-weighted-indicators-tr

ading
15. Exponential Moving Average (EMA): Meaning, Formula, and Calculation - Bajaj Finserv, accessed December 10, 2025, https://www.bajajfinserv.in/exponential-moving-average
16. Exponential Moving Average (EMA) Indicator - ZoomStocks, accessed December 10, 2025, https://www.zoomstocks.com/learn/technical-analysis/exponential-moving-average-ema-indicator
17. MA Slope Explained (2025): Moving Average Slope Trader's Guide - The Trading Analyst, accessed December 10, 2025, https://thetradinganalyst.com/moving-average-slope/
18. Bollinger Bands and MACD: Entry Rules Explained - LuxAlgo, accessed December 10, 2025, https://www.luxalgo.com/blog/bollinger-bands-and-macd-entry-rules-explained/
19. MACD and Bollinger Bands Strategy – Rules, Setup, Backtest (78% Win Rate), accessed December 10, 2025, https://www.quantifiedstrategies.com/macd-and-bollinger-bands-strategy/
20. Average True Range (ATR) and Average True Range Percent (ATRP) | ChartSchool | StockCharts.com, accessed December 10, 2025, https://chartschool.stockcharts.com/table-of-contents/technical-indicators-and-overlays/technical-indicators/average-true-range-atr-and-average-true-range-percent-atrp
21. RSI, MACD, Bollinger Bands and Volume-Based Hybrid Trading Strategy | by Sword Red, accessed December 10, 2025, https://medium.com/@redsword_23261/rsi-macd-bollinger-bands-and-volume-based-hybrid-trading-strategy-fb1ecfd58e1b
22. Technical Ratings - TradingView, accessed December 10, 2025, https://www.tradingview.com/support/solutions/43000614331-technical-ratings/
23. Using RSI, MACD, and Bollinger Bands Together in Trading - ICFM, accessed December 10, 2025, https://www.icfmindia.com/blog/using-rsi-macd-and-bollinger-bands-together-in-trading
24. Percentage Price Oscillator (PPO) - Strategy, Rules, Returns - QuantifiedStrategies.com, accessed December 10, 2025, https://www.quantifiedstrategies.com/percentage-price-oscillator/
25. What Is MACD? - Investopedia, accessed December 10, 2025, https://www.investopedia.com/terms/m/macd.asp
26. Average True Range (ATR) Indicator & Strategies - AvaTrade, accessed December 10, 2025, https://www.avatrade.com/education/technical-analysis-indicators-strategies/atr-indicator-strategies
27. Average True Range (ATR) Formula, What It Means, and How to Use It - Investopedia, accessed December 10, 2025, https://www.investopedia.com/terms/a/atr.asp
28. Intelligent Optimization Based Multi-Factor Deep Learning Stock Selection Model

and Quantitative Trading Strategy - MDPI, accessed December 10, 2025, https://www.mdpi.com/2227-7390/10/4/566
29. Multi-factor selection, ranking, and ploting - Kaggle, accessed December 10, 2025, https://www.kaggle.com/code/minglunw/multi-factor-selection-ranking-and-ploting
30. Rank Suppliers Based on Composite Score of Pricing and Requirements, accessed December 10, 2025, https://docs.oracle.com/en/cloud/saas/procurement/25a/oaprc/rank-suppliers-based-on-composite-score-of-pricing-and.html
31. Securities Transaction Tax (STT): Meaning, Features & Importance - HDFC Sky, accessed December 10, 2025, https://hdfcsky.com/sky-learn/share-trading/securities-transaction-tax-stt
32. Integrating Value and Momentum Stock Strategies, with Turnover Management, accessed December 10, 2025, https://www.cxoadvisory.com/value-premium/integrating-value-and-momentum-stock-strategies-with-turnover-management/
33. What are your best tips for reducing turnover? - General - Portfolio123 Community, accessed December 10, 2025, https://community.portfolio123.com/t/what-are-your-best-tips-for-reducing-turnover/62329
34. 3 Momentum Trading Strategies: Backtests, Setups, Rules, And Indicators, accessed December 10, 2025, https://www.quantifiedstrategies.com/momentum-trading-strategies/
35. How To Exit Your Momentum Trades With Trend Line Channels - Trading Setups Review, accessed December 10, 2025, https://www.tradingsetupsreview.com/exit-momentum-trades-trend-line-channels/
36. How to Use ATR for Volatility-Based Stop-Losses - LuxAlgo, accessed December 10, 2025, https://www.luxalgo.com/blog/how-to-use-atr-for-volatility-based-stop-losses/
37. Why Monthly Rebalancing is Key to Unlocking the Power of Momentum Investing, accessed December 10, 2025, https://blog.validea.com/why-monthly-rebalancing-is-key-to-unlocking-the-power-of-momentum-investing/
38. Momentum Investing — Base Portfolio | by Ankit Gupta - Medium, accessed December 10, 2025, https://ankitgupta-iitd.medium.com/momentum-investing-base-portfolio-292213807526
39. Optimal Rebalancing Frequency: How Often Should You Rebalance Your Momentum Portfolio? - smallcase, accessed December 10, 2025, https://www.smallcase.com/blog/optimal-rebalancing-frequency-how-often-should-you-rebalance-your-momentum-portfolio/